UNITED STATES
DEPARTMENT OF ENERGY
SAFEGUARDS AND SECURITY
CENTRAL TRAINING ACADEMY

FIRST RESPONDER TRAINING COURSE

TITLE:	LESSON 9: DOE CBW PROTECTIVE CLOTHING
TASK REQUIREMENT:	DOE O 470.1 DOE O 473.2
TARGET GROUP:	SECURITY POLICE OFFICERS
TIME ALLOTTED:	2 HOURS
INSTRUCTOR:	
METHOD OF INSTRUCTION:	LECTURE, DISCUSSION, AND PERFORMANCE TEST

PREPARED BY: _____

DATE: _____

APPROVED BY: _____

DATE: _____

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PROTECTIVE CLOTHING
GOALS AND OBJECTIVES

Instructional Goal

9.0 Upon successful completion of this lesson, the student will understand the characteristics and proper use of DOE protective garments.

Instructional Objectives

Upon successful completion of this lesson, the student will

9.1 Identify the purpose of wearing protective clothing.

9.2 Identify the parts of the DOE protective outfit.

9.3 Identify the characteristics of DOE protective garments.

9.4 Identify the shelf life of DOE protective garments.

9.5 Identify the service-life of DOE protective garments.

9.6 Distinguish between proper procedures for doffing of uncontaminated and contaminated protective clothing in uncontaminated areas.

9.7 Identify factors that reduce or destroy the protective capabilities of the protective clothing.

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PROTECTIVE CLOTHING

TEST ITEMS

9.1 The two-piece protective overgarment is designed to protect the wearer from vapors, aerosols, and small liquid droplets of chemical/biological agents.

a. True
b. False

9.2 Protective clothing (in addition to the mask and hood) consists of a two-piece protective overgarment, protective footwear covers (boots), and protective gloves.

a. True
b. False

9.3 Which of the following statements is FALSE?

a. The Gentex protective glove protects the user from all forms of chemical agents including vapors and liquids.
b. The overgarment is made from permeable materials that allow air and perspiration to pass through.
c. Footwear covers are made of butyl rubber that is impermeable to liquid and vapors.
d. When chemical agents contact the overgarment, the outer shell of cotton poplin ripstop fabric absorbs and spreads chemical agents and prevents saturation of the liner material.

9.4 The miniumum *shelf life* of the overgarment in factory sealed packaging is _____.

a. 1 year
b. 10 years
c. 14 years
d. 20 years

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PROTECTIVE CLOTHING

TEST ITEMS

9.5 Once the protective overgarment is removed from the factory bag, it has a standard *service life* of up to _____.

a. 10 days
b. 20 days
c. 30 days
d. 40 days
e. 50 days

9.6 Which of the following statements is TRUE regarding doffing of the *contaminated* protective clothing in an *uncontaminated* area?

a. The presence of contamination on the protective clothing does not affect doffing procedures in an uncontaminated area.
b. The doffing procedure for contaminated protective clothing is very important and you should wait for and follow the instructions of trained decontamination personnel.
c. Personnel do NOT need to be cleared by appropriate authorities prior to doffing protective clothing.
d. None of the above.

9.7 Which of the following factors *degrade, reduce,* or *destroy* the protective capabilities of the protective clothing?

a. Smoke
b. Solvent vapors
c. Fuel
c. All of the above
d. None of the above

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PROTECTIVE CLOTHING

COURSE MATERIALS AND REFERENCES

Materials

Overhead Projector
-1 each Gentex Overgarments (jacket and hood)
-1 each Gentex Vapor Protective Gloves
-1 each Acton Mk IV Protective Over-boots
-1 each Powered Air Purifying Respirator (PAPR)
-1 each Avon FM 12 Protective Mask
-1 each Butyl Hood
- 1 each Nametag to adhere to Velcro pile tape and/or duct tape with marker to demonstrate marking procedures

NOTE: Each student should have a full compliment of protective clothing, a protective mask, and 3M PAPR with filters.

Visual Aids

Overheads 1-25
Gentex Corporations sizing chart for garment selection.

Handouts

- 1 each *First Responder Student Workbook*

Site-specific directives for the use, storage and carrying of CBW clothing and respirators.

References

1. Gentex Corporation. Part I of II Technical Proposal for Chemical Protective Equipment. (2000). Carbondale, PA.
2. 3M. Powered Air Purifying Respirator Belt-Mounted Breathe Easy Resource Guide. (1999). St. Paul, MN.

LESSON PLAN

TITLE: PROTECTIVE CLOTHING	COURSE: FRTC

Instructor Notes:

I. INTRODUCTION — Overhead 1

Chemical/Biological agents can be very harmful, even deadly not only by inhalation, but also through contact with the skin. Protective clothing is designed to protect the wearer from vapors, aerosols, and small liquid droplets. Protective clothing can also protect the wearer from radioactive dust particles.

At a DOE facility the SPO will be the first responder and may be required to fight. Therefore, the equipment and protective clothing used must be effective, durable and allow the officer to function in extreme conditions.

This lesson plan will address characteristics, nomenclature and use of the protective garment, gloves, butyl hood and over-boots.

II. GENTEX OVERGARMENT — Overheads 2 - 3

The DOE has selected the Gentex Corporation's Protective Garment for standard issue to protective force personnel. Gentex has named this protective clothing the "DOE Protective Garment".

Gentex's chemical protective materials are produced under the "Lifetex" Protective Fabrics trademark. These fabrics have demonstrated lower heat stress, higher air permeability, ability to withstand repeated launderings, resistance to degradation by perspiration, and excellent chemical agent protection.

A. Testing

The DOE field-tested this equipment in July 1999 under the direction of Sandia National Laboratories and the Nonproliferation and National Security Institute.

B. Types of Clothing — Display overgarments

The DOE has purchased three specific items from Gentex for distribution based upon the

Instructor Notes:

testing procedures. The protective garments (jacket with integral protective hood and pants), and vapor protective gloves.

III. CHEMICAL PROTECTIVE GARMENT

Overheads 4 - 7

The "DOE Protective Garment" is a two-piece design consisting of a BDU style jacket and pants and is made of a 50% nylon / 50 % cotton construction in a ripstop poplin weave. The garment is a woodland camouflage design and is fabricated using a four-inch grade between sizes and is produced in short, regular, and long. Jacket and pants are designed for individual issue to ensure that the user gets the best optimal fit for both items.

Refer to manufacturer's sizing chart included with equipment for garment selection.

A. Jacket Design

The garment is made to wear over the duty uniform and is secured by a zippered front with a Velcro fastener, which runs the length of the zipper. Velcro straps are also included to fasten the sleeves securely around the protective gloves and to tighten around the waist. The jacket includes pockets and a hood with a drawcord, which can be adjusted to cover the periphery of the protective mask.

B. Pant Design

The garment pants are made to be worn over the duty uniform and are secured with the assistance of built in two-inch cloth suspenders with quick release buckle fasteners and one-inch Velcro straps around the waist. The pants have a high waist with a bib style front. The leg bottoms include a zipper on the inside of the leg, which goes from the leg bottoms to just below the knee. The leg bottom is finished with an elastic drawcord. These design features allow for easier and quicker donning over boots and the ability for leg bottom closure reducing the outside bulk of the lower leg.

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C. Performance Criteria

The garments provide protection against all known chemical warfare threat agents at the NATO standard level (10 gm/m²) for a period of up to 24 hours. Care should be taken to avoid rips and tears. Small tears can be repaired using standard duct tape (if necessary during tactical operations), but with larger rips and tears the garment should be taken out of service or the user removed from the environment.

1. Service Life

The service life is up to 30 days and the garments may be laundered up to four times during that period. Laundering can be done in a home laundry machine, using a detergent containing no phosphates. Drying should be done at medium temperature settings. *Do not dry clean.*

2. Shelf Life

The shelf life of the garments is a minimum of 10 years. Garments stored (never opened) and maintained under moderate temperature controls should last for at least fifteen years. After the ten years a few suits should be tested prior to extending shelf life.

D. Inspection

You should routinely inspect the protective garments for the following defects: cuts, hole or tears; peeled or worn coating; zipper torn, broken or inoperative; straps, cords, or hardware missing, frayed or torn.

Demonstrate inspection of garments

Instructor Notes:

IV. CHEMICAL PROTECTIVE GLOVES

Overheads 8 - 10

The Gentex glove is designed to provide vapor protection only. If there is a liquid chemical agent present an outer glove (e.g., butyl rubber) should be worn over the vapor protective glove. The gloves are gauntlet style extending up past the wrists. The gloves have an elastic band sewn in to secure the top of the glove firmly around the forearm and a Velcro strap around the wrist to secure the glove in place.

Display protective gloves

Identify site-specific policy for wearing of outer protective butyl glove (if applicable)

A. Protection and Size

The gloves provide protection against the full range of chemical warfare agent vapors for six hours and are sized to the standard glove sizing system. The gloves are available in 6 sizes (7, 8, 9, 10, 11, & 12).

B. Use

The gloves have rubber dots printed onto the fingers and palms for added gripping power and are intended to provide maximum dexterity. The gloves are not launderable, except for gloves being used for training purposes only.

C. Inspection

Demonstrate inspection of gloves

You should routinely inspect the gloves for the following defects: cuts, hole or tears; peeled or worn coating; or straps frayed or torn.

D. Service Life

The service life is a maximum of 15 days, but they should be replaced sooner under severe wear conditions when visible signs of wear/degradation begin to appear.

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V. PROTECTIVE BUTYL HOOD

Overheads 11 -12

The protective butyl hood is worn over the headgear and is designed to protect the neck and areas of the head not covered by the protective mask.

Display protective hood

A. Construction

The hood is made of a rubber-coated fabric, is olive drab in color and has elastic cords sewn around the neck and face. The hood also includes nylon straps with buckles that secure the hood under the armpits.

B. Protection

The hood provides protection against the full range of chemical warfare agents.

C. Inspection

Demonstrate inspection of hood

You should routinely inspect the hood for the following defects: cuts, hole or tears; peeled or worn coating; straps, cords, or hardware missing, frayed or torn.

VI. PROTECTIVE BOOTS

Overheads 13 - 14

The DOE has selected the ACTON Mk IV over-boots for distribution to the protective forces. The boots are black and available in three sole designs and six different sizes. It is important to note that the over-boots should be sized at least one size larger than your duty issued boot to ensure they fit correctly.

Display protective boots

A. Protection

The over-boots provide more than 24 hours of protection against chemicals.

B. Construction

The over-boots are fabricated from a high

Instructor Notes:

quality butyl rubber and are fitted with 3 easy to use closures that can be manipulated using a gloved hand. The over-boots have an extruded upper and a wide outsole to ensure a fit to any type of combat boot.

The over-boot is fully anti-static and has a large opening as well as a nylon reinforced backing strip for easy donning and doffing. The boots can by fully decontaminated.

C. Inspection

Demonstrate inspection of boots

You should routinely inspect the boots for the following defects: cuts, hole or tears; peeled or worn coating; straps, cords, or hardware missing, frayed or torn.

VII. WEARING THE PROTECTIVE CLOTHING

Overhead 15

The protective garments are designed to be worn over the duty uniform. Depending upon the season and site-specific equipment, the officer must determine what other clothing (cold weather gear, etc.) to wear and whether body armor will be worn over or under the protective garment, the wearer may have to wear a larger size. An alternative would be to wear added gear (e.g. field jacket) over the protective garment, but with the understanding that anything worn over would need to be disposed of as hazardous waste if worn in a true NBC environment.

It is very difficult to identify personnel wearing protective clothing and masks. When personnel are in this equipment, some means of identification should be developed (i.e. name tags). A Velcro pile tape is attached to the left chest of the protective jacket for attaching nametags.

A. As a minimum, print name and rank on tape.

Demonstrate marking the garment

B. Subdued cloth or duct tape is preferred.

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C. Place the name tags on the front of the jacket, as well as the front and rear of the headgear.

D. Utilize the Velcro pile tape and adhere a nametag for identification.

VIII. DONNING

Overheads 16 -22

Protective Force personnel, such as first responders and SRT members, who are assigned to respond to areas under chemical agent attack should be issued a full compliment of protective equipment (garments, gloves, over-boots mask and hood). It is important to note that, as a responder to an area that is under a chemical agent attack you should immediately don all of your protective clothing and mask before you move to the affected area.

Identify site-specific policies for donning of protective clothing, mask and 3M PAPR

Whether you don your mask prior to donning your protective clothing will be dependant upon variables such as distance from the affected area, wind direction and other environmental conditions and the air quality of the building you are located in. If for any reason you suspect that you may potentially be exposed to agents you should put on your mask first then don your protective clothing.

In order for the protective clothing to provide maximum protection, all closures should be as tight fitting as practical. Operational circumstances may dictate specific donning procedures, such as removing tactical equipment prior to donning. This lesson plan addresses general donning procedures only.

Trained personnel should be able to don all protective garments within 8 minutes.

A. Protective Garment Pants

Demonstrate donning pants

1. Unzip the lower portion of the pant legs and loosen the fasteners around the waist.

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2. Don the protective pants ensuring they completely cover your lower extremities.

3. Pull the cloth suspenders up over your shoulders and make any adjustments necessary to ensure a proper fit.

4. Zip the lower legs closed and tighten the Velcro closures on the waist and legs.

B. Protective Over-Boots

Demonstrate donning boots

1. Center your boot/shoe inside the over-boot and don the over-boots pulling up firmly securing your foot inside the over-boot.

2. Fasten the three rubber closures on the front of the boot.

3. The upper portion of the over-boot will be covered by the protective garment pant legs.

4. Secure the pant leg drawcords firmly around the upper portion of the over-boots. Tie off and tuck under the pant leg to avoid a snagging hazard.

C. Protective Garment Jacket

Demonstrate donning jacket

Don the jacket (tuck the integral hood in back if wearing the butyl hood) and secure the front zipper and Velcro closure. Tighten the Velcro straps around the waist.

D. Protective Gloves

Demonstrate donning gloves

1. Don the gloves and ensure they are completely covering the hands.

2. Fasten the Velcro straps (of the gloves) around the wrist to ensure a snug fit.

	Instructor Notes:
3. Pull the jacket sleeves over the gloves and tighten the Velcro straps (of the jacket) around the wrist to ensure a snug fit at the wrists.	
4. Don outer protective gloves (butyl) if liquid agents are suspected. **NOTE:** *If you are going to don outer protective gloves, don the protective mask and hood first.*	
E. Protective Mask and Hood	Demonstrate donning mask and hood
1. Don your protective mask and PAPR.	
2. Don the protective jacket hood over the mask.	
3. Tighten the drawcord of the jacket hood around the face-piece of the protective mask. Ensure the lenses, inlet and outlet valves are exposed. OR	
4. Don the butyl hood over the mask if you are not wearing the protective jacket hood. Ensure the integral jacket hood is tucked into the back of the jacket.	Demonstrate tucking the integral hood into back of jacket.
5. Secure the straps of the butyl/hood under both armpits and fasten the buckles.	
6. Secure the elastic cord around the face-piece of the protective mask. Ensure the lenses, inlet and outlet valves are exposed.	

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F. Tactical Gear

Demonstrate donning tactical gear

Don your tactical gear.

IX. DOFFING

Overhead 23

The doffing procedure for contaminated protective clothing is very important and you should wait for and follow the instructions of trained decontamination personnel. The scope of this lesson plan will be limited to general procedures for the removal of uncontaminated and contaminated protective clothing in uncontaminated areas.

Discuss site specific procedures for doffing contaminated and uncontaminated clothing

A. Officers should move to a designated staging area for monitoring, decontamination (if necessary), and doffing activities.

B. All personnel must first be cleared by appropriate authorities prior to doffing protective clothing.

C. If clothing ***has not been*** contaminated, the order of doffing is unimportant.

D. If clothing ***has been*** contaminated, officers will proceed through a pre-established decontamination line according to site-specific policies and procedures.

X. MAINTENANCE OF THE PROTECTIVE CLOTHING

Overhead 24

All protective clothing should be stored in a dry clean environment. Care should be given to all equipment to ensure that it is not exposed to unnecessary treatment.

Discuss site specific procedures for maintenance of protective clothing

Protection provided by protective garments is degraded in areas where it is saturated by petroleum products or exposed to smoke, fuel, or solvent vapors.

Overgarments may be laundered according to the manufacturer's specifications. All officers should strictly follow site-specific procedures for the care and

Instructor Notes:

cleaning of all protective clothing based upon the manufactures directions.

If for any reason you suspect that any piece of your protective clothing has been compromised you should immediately turn that piece of equipment in for replacement.

XI. CONCLUSION

Overhead 25

Protective Clothing is one of the layers available to protect the SPO from the harmful effects of chemical/biological agents. In order for this layer to perform as designed the SPO must know the equipment and be able to use it correctly.